

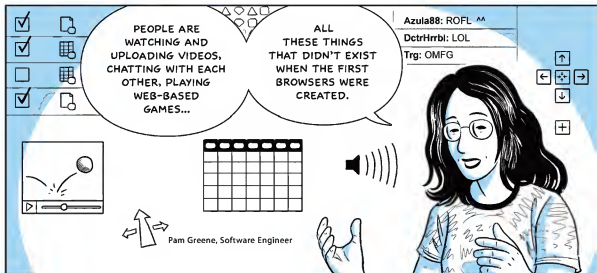


Google Chrome



Brian Rakowski,  
Product Manager

TODAY, MOST OF WHAT WE USE THE WEB FOR ON A DAY-TO-DAY BASIS AREN'T JUST WEB PAGES, THEY'RE APPLICATIONS.

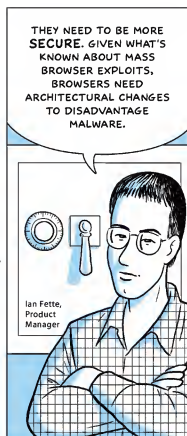


WOULDN'T IT BE GREAT, THEN, TO START FROM SCRATCH --



-- AND DESIGN SOMETHING BASED ON THE NEEDS OF TODAY'S WEB APPLICATIONS AND TODAY'S USERS?

2008



## Part One



Stability, Testing and the Multi-Process Architecture



WHEN WE STARTED THIS PROJECT, THE GEARS GUYS WERE SAYING THAT ONE OF THE PROBLEMS WITH BROWSERS IS THAT THEY'RE INHERENTLY SINGLE-THREADED.



BROWSER

HTML

JAVASCRIPT

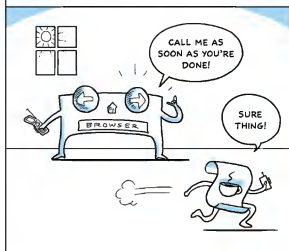
PLUGINS

HTML

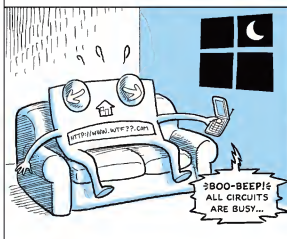
FOR EXAMPLE, ONCE YOU HAVE JAVASCRIPT EXECUTING, IT'S GOING TO KEEP GOING, AND THE BROWSER CAN'T DO ANYTHING ELSE UNTIL JAVASCRIPT RETURNS CONTROL TO THE BROWSER.

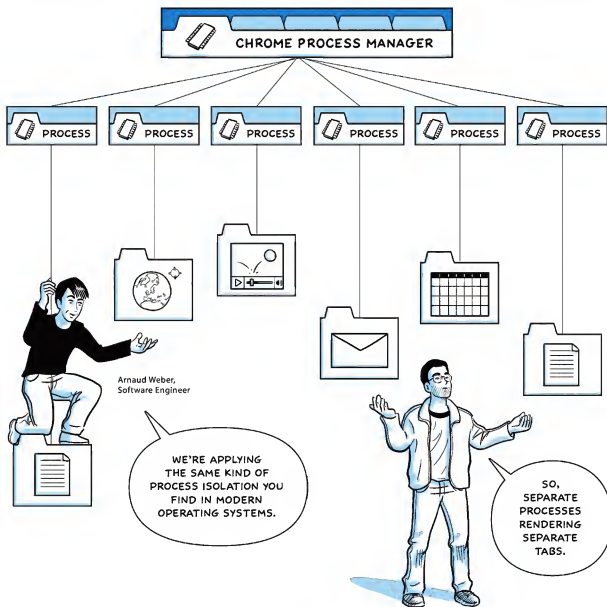
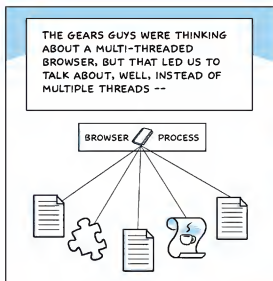


SO DEVELOPERS WRITE APIs THAT ARE ASYNCHRONOUS --



-- AND EVERY NOW AND THEN THE BROWSER LOCKS UP BECAUSE JAVASCRIPT IS HUNG UP ON SOMETHING.







AND NOW YOU  
HAVE SEPARATE  
JAVASCRIPT THREADS  
AS WELL.

ONE TAB CAN BE  
BUSY, WHILE YOU'RE  
STILL USING ALL THE  
OTHERS.



AND IF THERE'S A BROWSER BUG IN  
THE RENDERER (AND OUR  
EXPERIENCE IS THAT IT'S ALMOST  
IMPOSSIBLE TO ELIMINATE ALL BUGS),  
WE STILL ONLY LOSE THE ONE TAB.



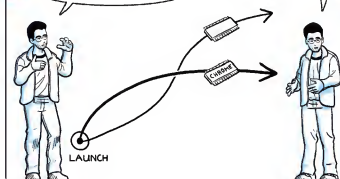
WHEN ONE TAB GOES DOWN YOU  
GET A 'SAD TAB' BUT IT DOESN'T  
CRASH THE WHOLE BROWSER.



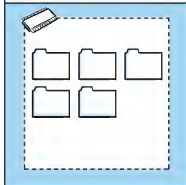
AND YES,  
IT REALLY  
LOOKS LIKE  
THIS.

A MULTI-PROCESS  
DESIGN MEANS USING A BIT  
MORE MEMORY UP FRONT. EACH  
PROCESS HAS A FIXED  
ADDITIONAL COST.

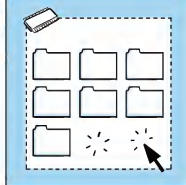
BUT OVER TIME, IT  
WILL ALSO MEAN  
LESS MEMORY  
BLOAT.



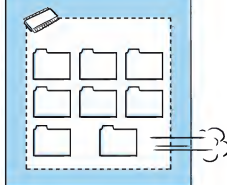
IN A TRADITIONAL BROWSER,  
YOU ONLY HAVE ONE PROCESS  
AND ONE ADDRESS SPACE  
THAT YOU KEEP LOADING WEB  
PAGES INTO.



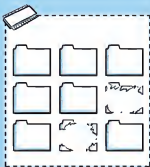
WHEN YOU HAVE TOO MANY  
TABS OPEN, YOU CAN CLOSE  
SOME TO FREE UP MEMORY.



WHEN YOU BRING IN ANOTHER  
TAB, YOU USE THE MEMORY  
THAT WAS PREVIOUSLY USED.



BUT AS TIME GOES ON, FRAGMENTATION RESULTS -- LITTLE BITS OF MEMORY STILL GET USED EVEN WHEN A TAB GETS CLOSED.

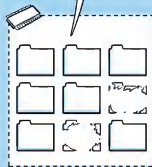


EITHER WE HAVE MEMORY THAT NOTHING CAN REFER TO AGAIN, OR THERE'S A PIECE OF DE-ALLOCATED MEMORY WE STILL HAVE POINTERS TO.

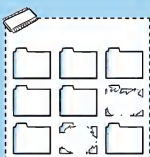


Mike Belshe,  
Software Engineer

SO WHEN THE BROWSER WANTS TO OPEN A NEW TAB, IT CAN'T FIT IT IN THE EXISTING SPACE --



-- AND SO THE OS HAS TO GROW THE BROWSER'S ADDRESS SPACE.



AND THIS PROBLEM GROWS ALL DAY, AS THE LIFETIME OF THE BROWSER EXTENDS.

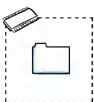
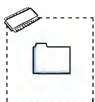
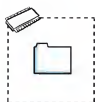
HURRY UP, DAMMIT!

TRY CLOSING SOME TABS.

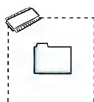


BUT WHEN A TAB IS CLOSED IN GOOGLE CHROME, YOU'RE ENDING THE WHOLE PROCESS --

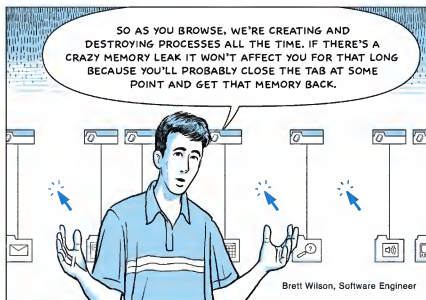
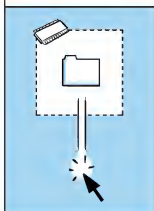




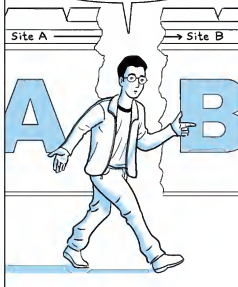
-- AND  
ALL THAT  
MEMORY  
GETS  
RECLAIMED.



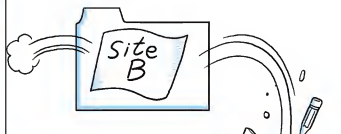
OPEN A NEW TAB  
NOW, AND YOU'RE  
STARTING FROM  
SCRATCH.



AND WE'RE TAKING IT ONE  
STEP FURTHER. SUPPOSE YOU  
NAVIGATE FROM DOMAIN A TO  
DOMAIN B. THERE'S NO NEED FOR  
ANY RELATIONSHIP BETWEEN  
THE TWO SITES --



-- SO NOW WE CAN THROW AWAY THE  
OLD RENDERING ENGINE, THE OLD DATA  
STRUCTURES, THE OLD PROCESS.



SO, EVEN WITHIN A  
TAB, WE CAN BE  
COLLECTING AND  
TOSSING OUT THE  
GARBAGE,  
RECYCLING THE  
WHOLE PROCESS.





AND JUST LIKE WITH YOUR OS, YOU CAN LOOK UNDER THE HOOD WITH GOOGLE CHROME'S TASK MANAGER TO SEE WHAT SITES ARE USING THE MOST MEMORY, DOWNLOADING THE MOST BYTES, AND ABUSING YOUR CPU.

WHY IS THIS APPLICATION DOWNLOADING THE ENTIRE INTERNET?

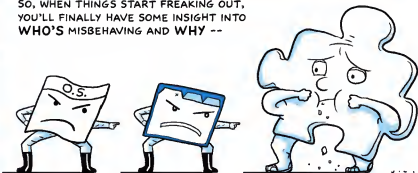


	Memory	CPU	Network
Firefox	74,000K	0	0
Messages from Mail	0	0	0
Google.com	14,768K	0	0
July 2008	0	0	0
Google - All items	17,200K	1	0
AdSense	0	0	0

YOU CAN EVEN SEE PLUG-INS WITHIN THE TAB, SINCE THEY APPEAR IN CHROME'S TASK MANAGER AS SEPARATE PROCESSES.



SO, WHEN THINGS START FREAKING OUT, YOU'LL FINALLY HAVE SOME INSIGHT INTO WHO'S MISBEHAVING AND WHY --



PLACING BLAME WHERE BLAME BELONGS.





WITHIN 20-30 MINUTES OF EACH NEW BROWSER BUILD, WE CAN TEST IT ON TENS OF THOUSANDS OF DIFFERENT WEB PAGES.

EACH WEEK, "CHROME BOT" TESTS MILLIONS OF PAGES, GIVING OUR DEVELOPERS EARLY RESULTS THEY'D OTHERWISE HAVE TO WAIT UNTIL EXTERNAL BETA FOR.

THE KEY IS CATCHING PROBLEMS AS EARLY AS POSSIBLE. IT IS LESS EXPENSIVE AND EASIER TO FIX THEM RIGHT AWAY. AFTER A FEW DAYS IT IS HARDER TO TRACK THEM DOWN.



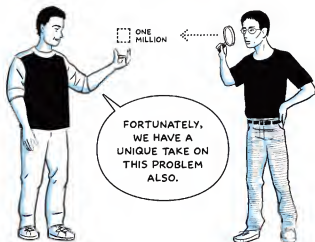
AND CATCHING THEM EARLY HELPS ENGINEERS WRITE BETTER CODE. THEY SAY, "OH, THIS MISTAKE IS PART OF A PATTERN" AND THE NEXT TIME, THEY'RE LESS LIKELY TO MAKE IT.



Erik Kay, Software Engineer

ONE BILLION

OF COURSE, THERE ARE BILLIONS, MAYBE TRILLIONS OF WEBPAGES OUT THERE. IF EACH BUILD IS TESTED AGAINST A MILLION SITES, WHICH MILLION DO WE USE?



### Web Images

**We already rank** pages based on which pages the average user is most likely to visit.

[www.alreadyrank.com](http://www.alreadyrank.com) - Similar Pages

**At the very least**, we'll make sure we won't be broken on the kinds of sites people use on a day-to-day basis.

[www.attheveryleast.com](http://www.attheveryleast.com) - Similar Pages

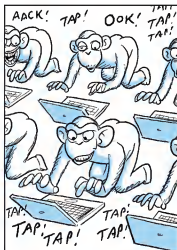
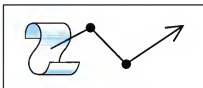


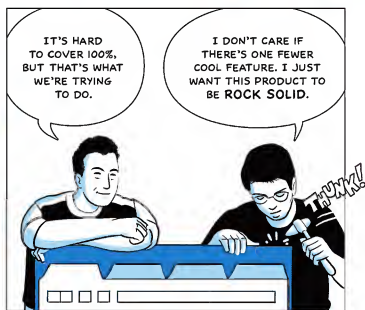
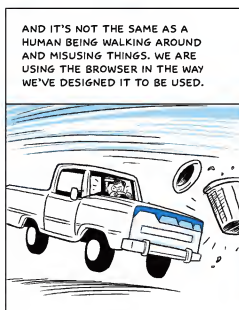
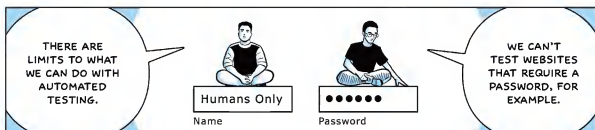
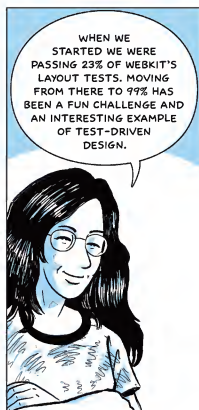
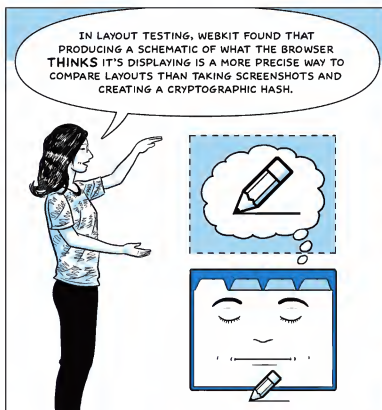
THERE ARE SEVERAL WAYS WE TEST EACH CHECK-IN. FROM UNIT TESTS OF INDIVIDUAL PIECES OF CODE --

-- TO AUTOMATED UI TESTING OF SCRIPTED USER ACTIONS LIKE "CLICKED BACK BUTTON... WENT TO PAGE..." --

-- TO FUZZ TESTING: SENDING YOUR APPLICATION RANDOM INPUT.

Pam  
Greene,  
Software  
Engineer

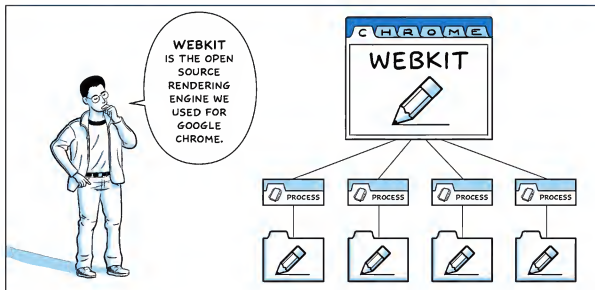




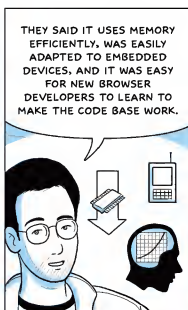
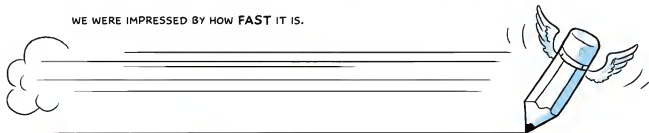
## Part Two

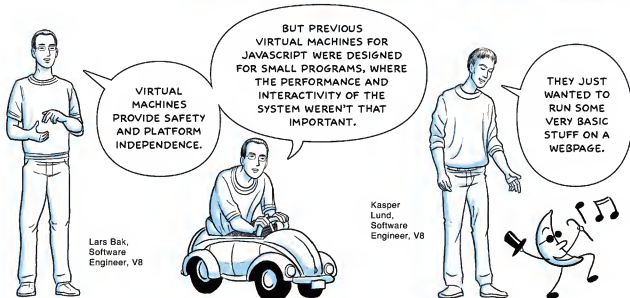
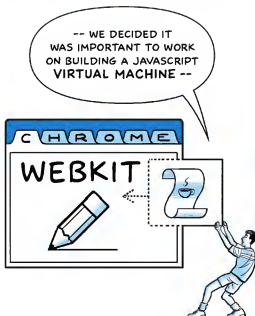
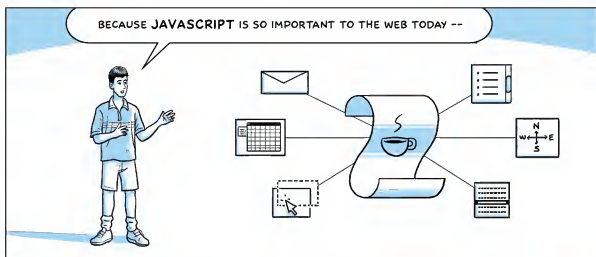


Speed: WebKit and V8



WE WERE IMPRESSED BY HOW FAST IT IS.







BUT NOW,  
YOU HAVE WEB APPLICATIONS LIKE  
GMAIL THAT ARE USING THE WEB  
BROWSER TO ITS FULLEST WHEN IT COMES  
TO DOM MANIPULATIONS AND  
JAVASCRIPT --

-- AND THAT  
SIMPLISTIC APPROACH TO  
JAVASCRIPT ENGINES ISN'T  
ENOUGH ANYMORE.



SO WE STARTED WITH  
NO CODE, JUST SOME WILD  
IDEAS ABOUT HOW TO MAKE  
IT GO REALLY FAST --

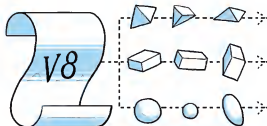
-- SUCH AS  
INTRODUCING  
HIDDEN CLASS  
TRANSITIONS.



JAVASCRIPT ITSELF IS CLASSLESS.  
YOU CAN CREATE A NEW OBJECT,  
DYNAMICALLY ADD PROPERTIES TO  
IT AND GO ON.



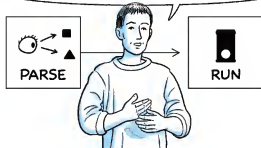
BUT IN V8, AS EXECUTION GOES ON,  
OBJECTS THAT END UP WITH THE SAME  
PROPERTIES WILL SHARE THE SAME HIDDEN  
CLASS AND WE CAN START APPLYING  
DYNAMIC OPTIMIZATIONS BASED ON THAT.

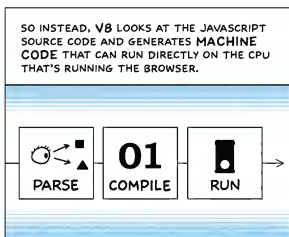


ANOTHER FACTOR  
IN V8'S SPEED IS  
DYNAMIC CODE  
GENERATION.



WHEN OTHER JAVASCRIPT ENGINES RUN, THEY  
LOOK AT THE JAVASCRIPT SOURCE CODE AND  
GENERATE AN INTERNAL REPRESENTATION OF IT  
THEY CAN INTERPRET.

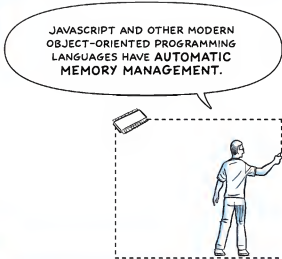
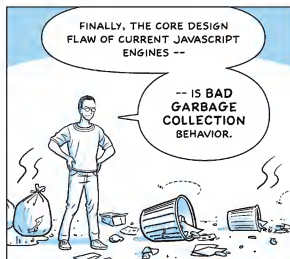




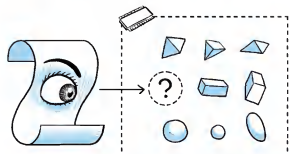
WHEN YOU INTERPRET ONCE AND COMPILE MACHINE CODE, THEN THAT CODE IS YOUR REPRESENTATION OF THE JAVASCRIPT SOURCE CODE AND IT DOESN'T NEED TO BE INTERPRETED, IT JUST RUNS.



1 1 0 1 0 1 0 0 0 1 0 1 0 0 0 1 0 1 0 1 0 0 1 0 1 0 0 0 0 1 0 1 0 1 0 0 0 0 1 0 1 0 1



IF YOU DON'T HAVE A REFERENCE TO AN OBJECT ANYMORE, ITS MEMORY CAN BE RECLAIMED BY THE SYSTEM. THAT'S GARBAGE COLLECTION, AND ITS A FAIRLY TRIVIAL PROCESS.

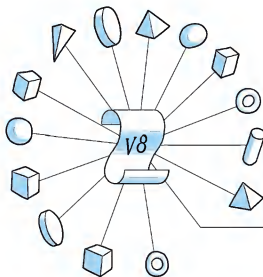






-- YOU START SEARCHING THROUGH THE EXECUTION STACK TO SEE WHICH WORDS LOOK LIKE POINTERS.

BUT THE ONES THAT SORT OF LOOK LIKE POINTERS COULD ALSO BE INTEGERS THAT JUST HAPPEN TO HAVE THE SAME ADDRESS AS AN OBJECT IN THE OBJECT HEAP.

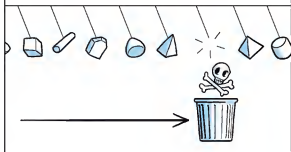


IN V8, WE ARE USING **PRECISE** GARBAGE COLLECTION, SO WE KNOW PRECISELY WHERE **ALL** OF THE POINTERS ARE ON THE STACK AND THIS GIVES US SEVERAL ADVANTAGES.

ONE IS THAT WE CAN MIGRATE AN OBJECT TO ANOTHER PLACE AND JUST REWIRE THE POINTER.

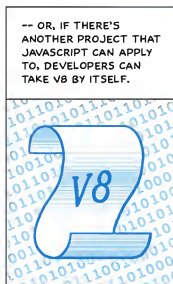
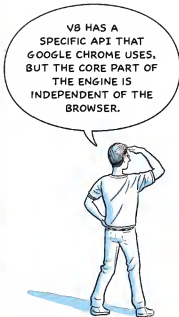
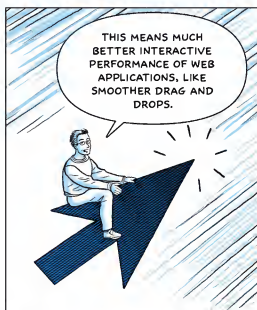


AND, BECAUSE WE KNOW PRECISELY WHERE ALL THE POINTERS ARE, WE CAN ALSO IMPLEMENT **INCREMENTAL** GARBAGE COLLECTION.



MEANING QUICK GARBAGE COLLECTION ROUND-TRIPS THAT ARE CLOSE TO A FEW MILLISECONDS, COMPARED TO PROCESSING ALL 100MB OF DATA WHICH COULD CAUSE SECOND-LONG PAUSES.





### Part Three



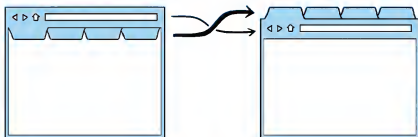
Search and the User Experience



IN GOOGLE CHROME, THE PRIMARY PIECE OF THE USER INTERFACE IS THE TAB.



Ben Goodger,  
Software Engineer

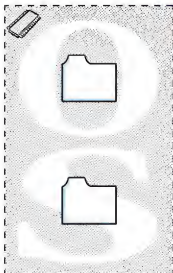


AS SOON AS WE STARTED THINKING ABOUT IT THAT WAY, THE DESIGN NATURALLY FOLLOWED.



WE BEGAN REBUILDING THE UI SO THE TABS WERE ON TOP.

WE COULD DETACH THE TABS EASILY BECAUSE OF THE SEPARATION OF THE BROWSER AND TAB PROCESSES.



AND BECAUSE THE TABS ARE THE MOST IMPORTANT PART OF THE UI, EACH TAB HAS ITS OWN CONTROLS.

AND ITS OWN URL BOX.

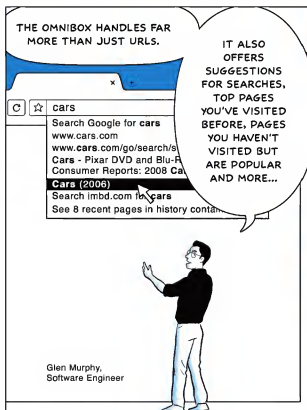


WHICH AROUND HERE WE'VE BEEN CALLING THE 'OMNIBOX.'



THE OMNIBOX HANDLES FAR MORE THAN JUST URLS.

IT ALSO OFFERS SUGGESTIONS FOR SEARCHES, TOP PAGES YOU'VE VISITED BEFORE, PAGES YOU HAVEN'T VISITED BUT ARE POPULAR AND MORE...

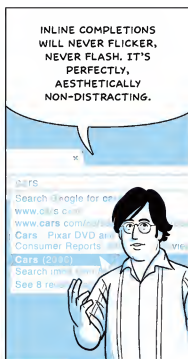


Glen Murphy,  
Software Engineer

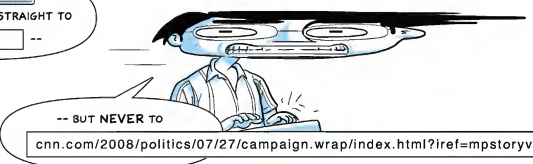
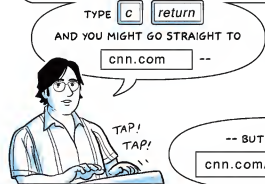
YOU HAVE FULL TEXT SEARCH OVER YOUR HISTORY. IF YOU FOUND A GOOD SITE FOR DIGITAL CAMERAS YESTERDAY, YOU DON'T HAVE TO BOOKMARK THAT PAGE.

JUST TYPE 'DIGITAL CAMERA' AND QUICKLY GET BACK TO IT.

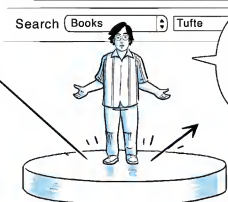




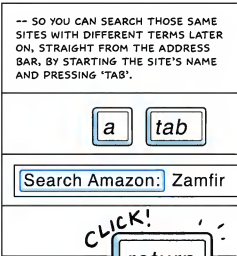
PLUS, IT'LL ONLY AUTOCOMPLETE TO SOMETHING YOU'VE EXPLICITLY TYPED BEFORE.



AND WHEN YOU SEARCH ON SITES LIKE AMAZON, WIKIPEDIA OR EVEN GOOGLE --



-- THE SEARCH BOXES ON THOSE PAGES ARE CAPTURED ON YOUR LOCAL SYSTEM --



OPEN A NEW TAB IN  
MOST BROWSERS TODAY,  
AND YOU'LL GET YOUR  
HOMEPAGE.

SOME USERS  
HAVE A BLANK  
PAGE BECAUSE  
IT OPENS  
QUICKLY.



BUT THE ACTION  
OF OPENING A TAB IS A  
STATEMENT OF  
INTENT: YOU WANT TO  
GO SOMEPLACE!

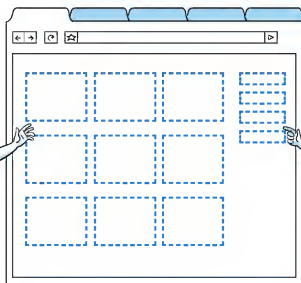


MAYBE YOU  
KNOW WHERE.  
MAYBE YOU DON'T  
KNOW AND NEED TO  
SEARCH.



WE'RE GOING TO SHOW A PAGE  
THAT IS DESIGNED TO BE FAST,  
BUT ALSO HELPS YOU COMPLETE  
THAT ACTION.

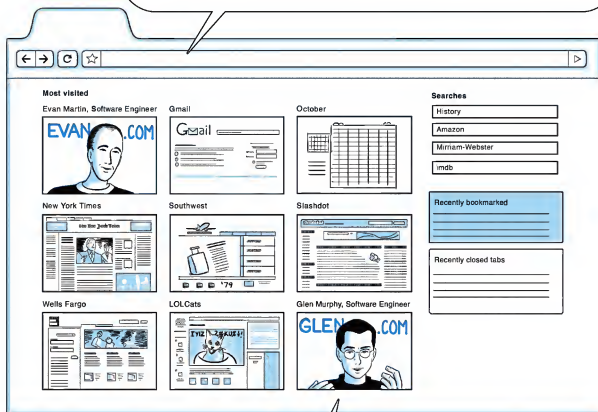
OUR  
DEFAULT  
EXPERIENCE,  
THEN, IS THE NEW  
TAB PAGE WITH  
YOUR NINE MOST  
VISITED PAGES  
HERE --



-- AND THE  
SITES YOU  
SEARCH ON  
MOST HERE.



IT'S THE PAGES YOU WERE GOING TO TYPE INTO THE URL BOX ANYWAY.  
GOOGLE CHROME USES YOUR BEHAVIOR IN THE OMNIBOX TO FEED INTO THAT PAGE.



YOU MIGHT OPEN IT AND BE, LIKE, WHAT'S ALL MY STUFF DOING HERE? BUT  
AFTER A WHILE, YOU SEE THIS PAGE AND IT'S JUST YOU, IT'S **YOUR** BROWSER.

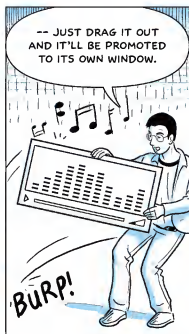
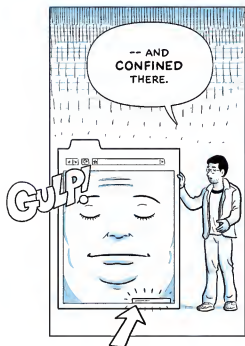
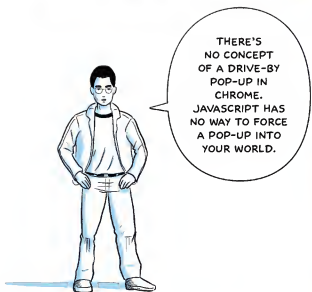
GOOGLE CHROME HAS A PRIVACY  
MODE. YOU CAN CREATE AN  
'INCOGNITO' WINDOW AND NOTHING  
THAT OCCURS IN THAT WINDOW IS  
EVER LOGGED ON YOUR COMPUTER.



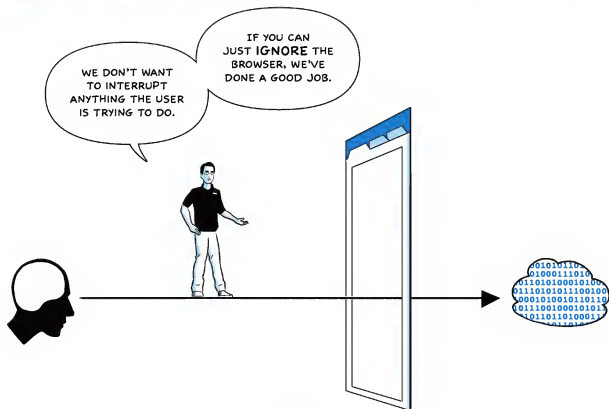
IT'S A READ-ONLY MODE: YOU  
CAN STILL ACCESS YOUR BOOKMARKS,  
BUT NONE OF YOUR HISTORY IS SAVED  
IN THE BROWSER --

-- AND  
WHEN YOU  
CLOSE THE  
WINDOW, THE  
COOKIES FROM  
THAT SESSION  
ARE WIPED  
OUT.









## Part Four

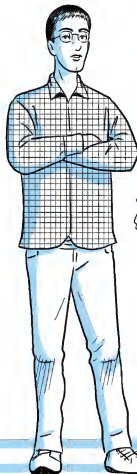


Security, Sandboxing and Safe Browsing



MALWARE AND PHISHING ARE A HUGE PROBLEM FOR USERS, AFFECTING TRUST AND CONFIDENCE IN THE WEB.

WHEN WE STARTED THIS PROJECT, IT WAS A VERY DIFFERENT LANDSCAPE FROM WHEN THE OTHER BROWSERS STARTED.



Ian Fette,  
Product Manager



John Abd-El-Malek,  
Software Engineer

BACK THEN, IT WAS ABOUT RENDERING THE PAGE AND GETTING THE COOL THINGS WORKING. THERE WAS NO MONETARY INCENTIVE TO PUT MALWARE ON USERS' MACHINES.



NOW, MALWARE IS VERY FINANCIALLY DRIVEN. IT'S ALL ABOUT STEALING PASSWORDS AND MOVING MONEY AROUND.



IN THINKING ABOUT SECURITY, WE BEGAN WITH THE ASSUMPTION THAT YOUR BROWSER WOULD GET COMPROMISED.

YOU WILL EVENTUALLY ENCOUNTER MALWARE.

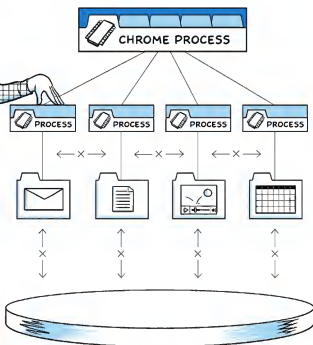


Carlos Pizano,  
Software Engineer

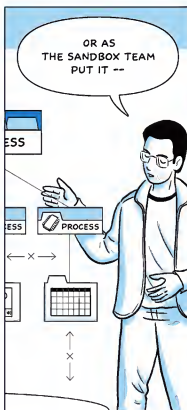
WITH **SANDBOXING**, OUR GOAL IS TO PREVENT MALWARE FROM INSTALLING ITSELF ON YOUR COMPUTER OR USING WHAT HAPPENS IN ONE TAB TO AFFECT WHAT HAPPENS IN ANOTHER.

SO, FOR EACH OF THESE PROCESSES WE'VE STRIPPED AWAY ALL OF THEIR RIGHTS.

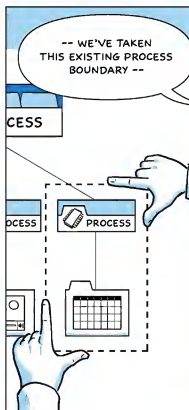
THEY CAN COMPUTE BUT THEY CAN'T WRITE FILES TO YOUR HARD DRIVE OR READ FILES FROM SENSITIVE AREAS LIKE YOUR DOCUMENTS OR DESKTOP.



OR AS THE SANDBOX TEAM PUT IT --



-- WE'VE TAKEN THIS EXISTING PROCESS BOUNDARY --



-- AND MADE IT INTO A JAIL.

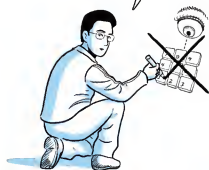


THAT MEANS NO  
WATCHING YOU  
TYPE YOUR CREDIT  
CARD NUMBER.

NO  
INTERACTING  
WITH MOUSE  
OPERATIONS.

NO  
READING  
YOUR TAX  
RETURNS.

NO  
TELLING  
WINDOWS  
TO RUN  
AN EXECUTABLE  
AT START-UP.



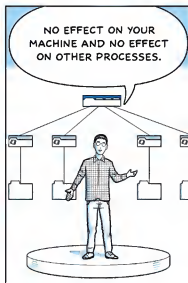
SOMETHING BAD  
COULD BE RUNNING  
IN THIS TAB --



-- BUT AS SOON  
AS YOU CLOSE IT,  
IT'S GONE.



NO EFFECT ON YOUR  
MACHINE AND NO EFFECT  
ON OTHER PROCESSES.



THE PERIMETER OF THE  
SANDBOX IS LARGELY BASED ON  
PERMISSIONS.



Mark Larson,  
Program Manager

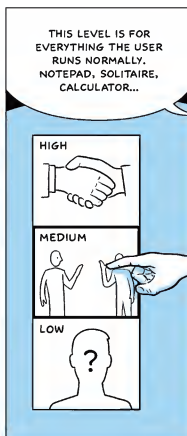
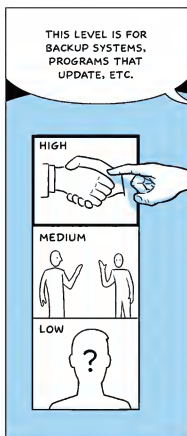
VISTA USES A MODIFIED VERSION  
OF THE BIBA SECURITY MODEL WHICH  
HAS THREE LEVELS.

VERY  
TRUSTED.

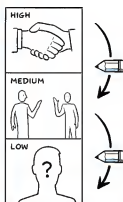
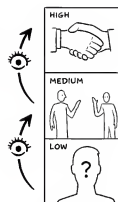
SOMEWHAT  
TRUSTED.

NOT  
TRUSTED AT  
ALL.



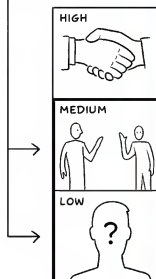


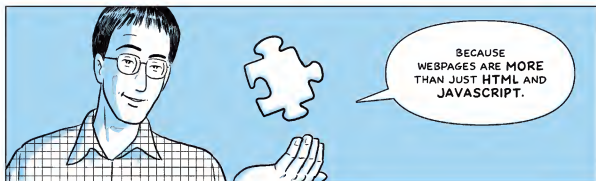
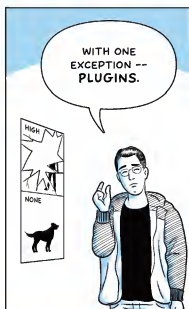
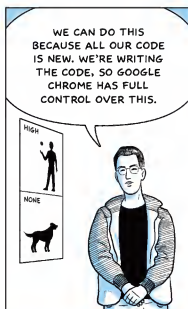
READING IS ALLOWED FROM LOW TO HIGH --

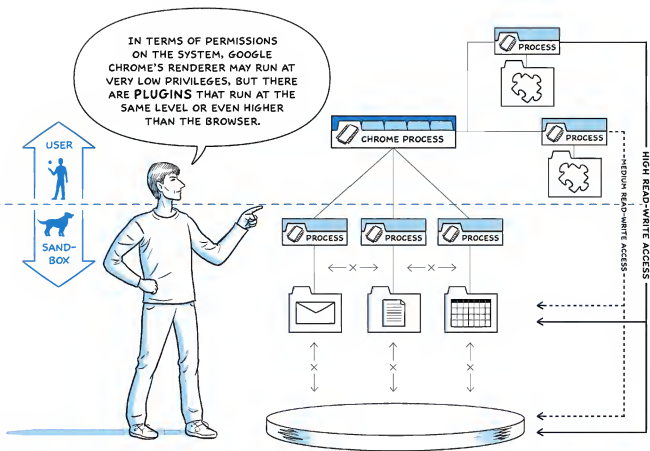


-- BUT WRITING IS ALLOWED ONLY FROM HIGH TO LOW.

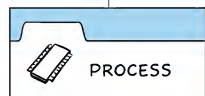
TYPICALLY, APPLICATIONS RECEIVING AND PROCESSING DATA FROM THE INTERNET ARE SPLIT INTO THE TWO LOWER LEVELS.







-- TO  
THIS.

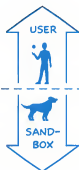


WHEN A  
PLUGIN  
COMBINES  
WITH HTML  
AND  
JAVASCRIPT, IT  
ALL RUNS IN  
THE SAME  
PROCESS.



IF  
ANY PART  
CRASHES OR  
STARTS  
CORRUPTING  
MEMORY,  
THEY'RE ALL  
HOSED.

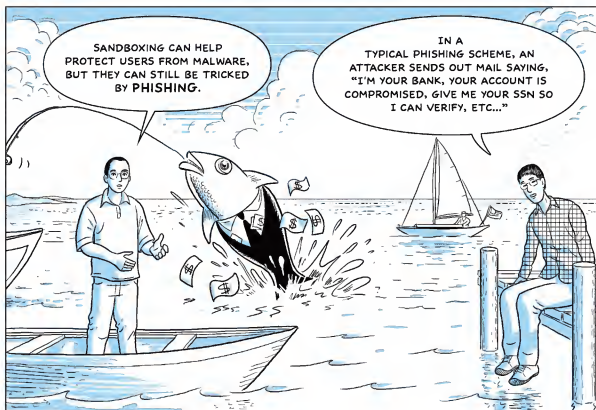
SO I  
WORKED ON  
RIPPING PLUGINS OUT  
OF THE RENDERING  
PROCESS AND PUTTING  
THEM IN A SEPARATE  
PROCESS ALL THEIR  
OWN.

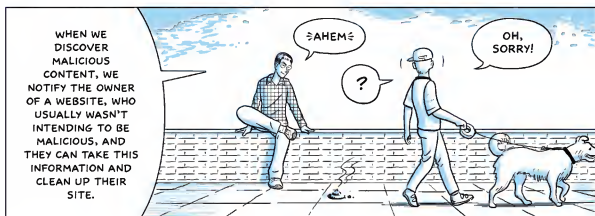
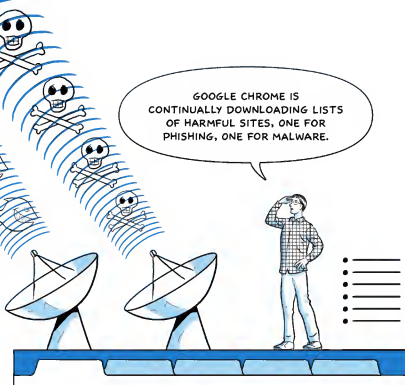


IN  
THAT WAY,  
THE REST OF THE  
PAGE CAN STILL BE  
SANDBOXED, EVEN  
IF THE PLUGIN  
CAN'T BE.







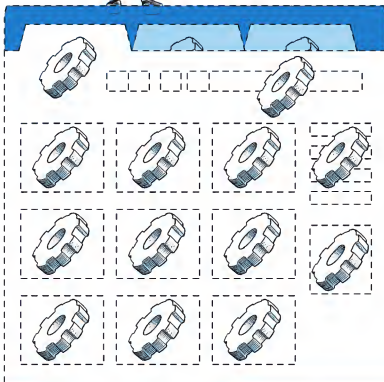




Aaron Boodman,  
Software Engineer



ANOTHER THING  
WE BUILT INTO  
GOOGLE CHROME IS  
GEARS.



GEARS BASICALLY  
ADDS AN API TO  
YOUR BROWSER -- AN  
EXTENSION THAT  
IMPROVES ITS  
CAPABILITIES.



FROM MY  
PERSPECTIVE, GOOGLE CHROME  
AND GEARS ARE ENTERING THE WEB  
FROM TWO DIRECTIONS.

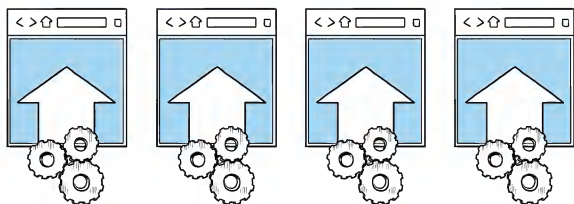
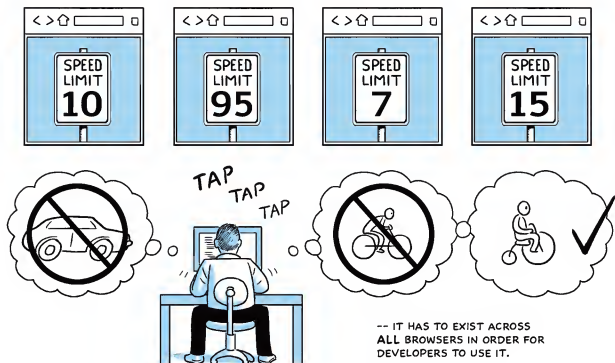
THE BROWSER PROJECT IS  
AN EFFORT TO MAKE THE WEB  
BETTER FOR USERS.



THE GEARS TEAM WANTS  
TO MAKE THE WEB BETTER  
FOR **DEVELOPERS**.



THERE ARE A LOT OF LIMITATIONS TO THE KINDS OF APPLICATIONS THAT YOU CAN BUILD TODAY WITH WEB BROWSERS, AND THE SUBSET OF THINGS YOU CAN DO IS DIFFERENT FOR EACH BROWSER. IF ONE BROWSER HAS A COOL FEATURE, THAT DOESN'T HELP --



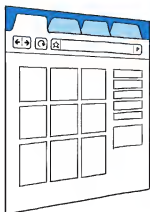
GEARS IS TRYING TO IMPROVE THE BASE FUNCTIONALITY OF ALL BROWSERS, INCLUDING GOOGLE CHROME.

WHATEVER THE ADVANTAGES OF BUILDING NATIVE APPS OVER WEB APPS, WE WANT TO BUILD THOSE ENHANCEMENTS THROUGH GEARS --

-- AND HELP THEM MAKE THEIR WAY INTO NEW STANDARDS ACROSS THE WEB.

SO, OPEN  
STANDARDS ARE ONE  
WAY TO HELP ALL  
BROWSERS GET  
BETTER.

THE TEAM HAS  
ALSO DONE SOME  
INTERESTING THINGS WITH  
SPEED, STABILITY AND  
THE UI, LIKE THE NEW  
TAB PAGE.



Chris DiBona,  
Open Source Programs Manager

SOME  
OF THESE  
MIGHT BECOME  
STANDARDS --



-- SOME MIGHT  
NOT.



BUT --



-- SINCE  
IT'S OPEN  
SOURCE --

-- OTHER BROWSER  
DEVELOPERS CAN  
TAKE WHAT THEY  
WANT OUT OF IT.



THEY DON'T HAVE  
TO PAY US. THEY  
DON'T HAVE TO ASK  
OUR PERMISSION.

THEY DON'T HAVE  
TO SHARE PATCHES OR  
REPORT BUGS.\*



\* THOUGH, IF THEY LIKE, WE HAVE  
SYSTEMS IN PLACE FOR THAT.

BUT THEY  
CAN BUILD ON  
WHAT WE'VE DONE  
AND BRING THEIR  
OWN CREATIVITY  
TO IT.



SURE, WE  
COULD SHIP A  
PROPRIETARY  
BROWSER AND  
HOLD IT IN.



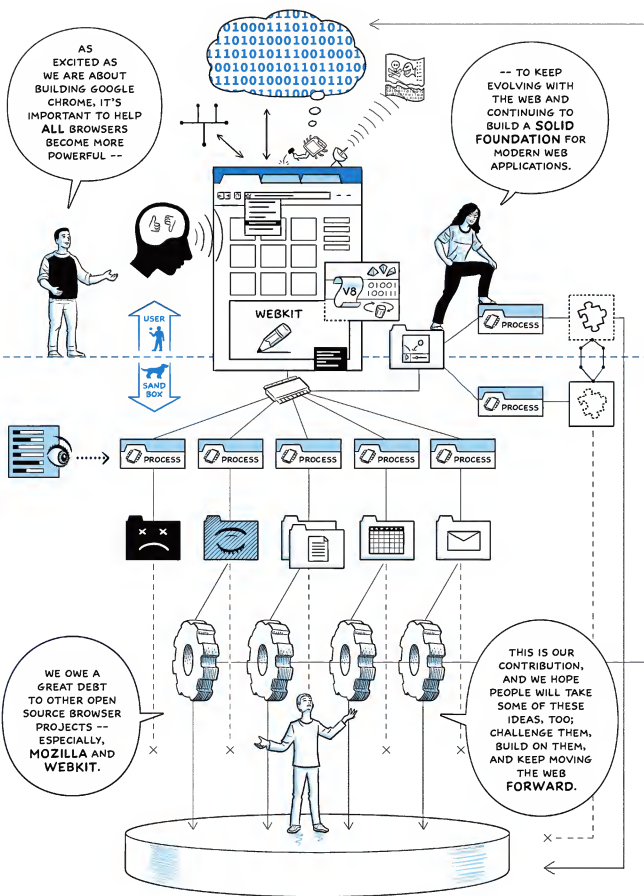
BUT GOOGLE **LIVES**  
ON THE INTERNET.

IT'S IN OUR  
INTEREST TO MAKE THE  
INTERNET BETTER AND  
WITHOUT COMPETITION WE  
HAVE STAGNATION.



THAT'S WHY  
WE'RE OPEN  
SOURCING THE  
WHOLE THING. WE  
NEED THE INTERNET  
TO BE A FAIR,  
SMART, SAFE  
PLACE.









**Words**

The Google Chrome Team

**Comics Adaptation**

Scott McCloud



[www.google.com/chrome](http://www.google.com/chrome)

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